

DETAILED ACTION

Status of Claims

1. Claim 1 is amended in view of applicant's amendment filed 9 January 2008.

Therefore, claims 1-7 are currently under examination.

Status of Previous Rejections

2. The rejection of claims 1-7 under 35 U.S.C. 103(a) as being unpatentable over Gealer et al. US 4,765,865(Gealer) in view of Zechman US 3,774,079(Zechman) is withdrawn in view of applicant's claim amendments filed 9 January 2008.
3. The rejection of claims 1-7 under 35 U.S.C. 103(a) as being unpatentable over Gealer et al. US 4,765,865(Gealer) in view of Shaw US 3,560,357(Shaw) is withdrawn in view of applicant's claim amendments filed 9 January 2008.
4. The rejection of claims 1-7 under 35 U.S.C. 103(a) as being unpatentable over Gealer et al. US 4,765,865(Gealer) in view of Van Dijk US 3,616,345(Van Dijk) is withdrawn in view of applicant's claim amendments filed 9 January 2008.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nojiri et al. US 5,173,149(Nojiri) in view of Zechman US 3,774,079(Zechman).

Nojiri teaches an electroetching apparatus for selectively removing a conductive layer from a wafer substrate(abstract). The electroetching apparatus of Nojiri comprises a potentiostat(Fig. 5 #21) having three terminals each connected to a counter electrode(Fig. 5 #4), a working electrode couple to the substrate(Fig. 5 #3) and a reference electrode(Fig. 5 #22) respectively, Nojiri further teaches a reaction vessel storing the electrolyte and housing the wafer substrate, the counter electrode and the reference electrode that are immersed in the electrolyte(Fig. 5 #1-2). The reference electrode is made of silver/silver chloride(col. 6, line 20).

Regarding claim 1, Nojiri teaches all the components of the claimed apparatus except the amended feature of an independent clip electrically coupled to a portion of the conductive layer on the substrate.

Zechman teaches electrolytically fabricating semiconductor circuits comprising positioning the semiconductor wafer and providing electrical current to the wafer via an annular clip(Fig. 1 #5).

Therefore, it would have been obvious to one of ordinary skill in the art to have incorporated the annular contact clip as taught by Zechman into the electroetching apparatus of Nojiri in order to provide a large contact surface area to ensure adequate current flow as taught by Zechman(col. 3 lines 56-63).

In addition, Nojiri teaches that the etching voltage is controlled by comprising the etching current value and the etching potential of the semiconductor substrate relative to the reference electrode and adjusting etching current and potential accordingly(col. 3 lines 11-28). Therefore, the potentiostat in the apparatus of Nojiri in view of Zechman is

inherently capable of maintaining a potential difference between a substrate and a reference electrode at the claimed fixed valued range.

Furthermore, the claim recitation of how the potential difference between the substrate and the reference electrode is maintained and when the selective removal of conductive layer is ended does not lend patentability to the instant apparatus claims since they are directed to how the claimed apparatus is being operated. It is well settled that a claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987). See MPEP 2114. Since the recited process limitations do not structurally differentiate the claimed apparatus from the apparatus of Nojiri in view of Zechman, the recited process limitations do not render the instant claim patentable.

Furthermore, the claimed substrate having sub-micron interconnect features and the conductive layer of nickel on a substrate do not render the instantly claimed apparatus patentable since the sub-micron interconnect features and conductive nickel layer on the substrate are part of an article that is worked on by the claimed apparatus. It is well settled that "expressions relating the apparatus to contents thereof during an intended operation are of no significance in determining patentability of the apparatus claim". *Ex parte Thibault*, 164 USPQ 666, 667 (Bd. App. 1969). Furthermore, "[i]nclusion of material or article worked upon by a structure being claimed does not impart patentability to the claims." *In re Young*, 75 F.2d 996, 25 USPQ 69 (CCPA

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1935) (as restated in *In re Otto*, 312 F.2d 937, 136 USPQ 458, 459 (CCPA 1963)). See MPEP 2115 [R-2].

The examiner also maintains a position that the apparatus of Nojiri in view of Zechman is capable of performing in the claimed fashion.

Regarding claim 2, the apparatus of Nojiri in view of Zechman is capable of varying a current between the substrate and the counter electrode to maintain the potential different at a fixed value as claimed(col. 3 lines 11-28).

Regarding claims 3-7, the claimed conductive layer, barrier layer and the sub-micron interconnect features are directed to the wafer substrate which is worked on by the claimed apparatus. Therefore, these claim limitations does not lend patentability to the instant apparatus claims for the same reasons as stated in the rejection of claim 1 above. See MPEP 2115 [R-2].

7. Claims 1-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nojiri et al. US 5,173,149(Nojiri) in view of Shaw US 3,560,357(Shaw).

The teachings of Nojiri are discussed in paragraph 6 above. However, Nojiri does not explicitly teach the claimed amended feature of an independent clip electrically coupled to a portion of the conductive layer on the substrate.

Shaw teaches an apparatus for selective electroetching of a substrate(title). Shaw further teaches using a spring clip for positioning the substrate in an electrolytic bath and to provide electrical current to the substrate(Fig. 2 #19, col. 3 lines 55-68).

Therefore, it would have been obvious to one of ordinary skill in the art to have incorporated the spring clip as taught by Shaw into the electroetching apparatus of Nojiri

in order to hold and position the substrate in the electrolytic bath at the same time providing electrical current to the substrate as shown in Shaw.

The remaining claim limitations regarding claims 1-7 are rejected for the same reasons as stated in paragraph 6 above.

8. Claims 1-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nojiri et al. US 5,173,149(Nojiri) in view of Van Dijk US 3,616,345(Van Dijk).

The teachings of Nojiri are discussed in paragraph 6 above. However, Nojiri does not explicitly teach the claimed amended feature of an independent clip electrically coupled to a portion of the conductive layer on the substrate.

Van Dijk teaches an apparatus for selective electroetching of a substrate(title). Van Dijk further teaches using a clip for positioning the substrate in an electrolytic bath and to provide electrical current to the substrate(Fig. 4 #30-31, col. 4 lines 24-71).

Therefore, it would have been obvious to one of ordinary skill in the art to have incorporated the spring clip as taught by Van Dijk into the electroetching apparatus of Nojiri in order to hold and position the substrate in the electrolytic bath at the same time providing electrical current to the substrate as shown in Van Dijk.

The remaining claim limitations regarding claims 1-7 are rejected for the same reasons as stated in paragraph 6 above.

Response to Arguments

9. Applicant's arguments filed 9 January 2008 have been fully considered but they are not persuasive.

In the remarks, applicant argues that none of the references, either alone or in combination, teaches the claimed maintenance of potential difference between the substrate and the reference electrode at claimed -0.4 to +0.2 volts range.

The examiner does not find applicant's argument persuasive since the claimed potential difference between the substrate and the reference electrode is directed to how the claimed apparatus is being operated (i.e. process limitation) and does not provide any structural limitation that differentiate the claimed apparatus from the apparatus of Nojiri in view of Zechman, Shaw or Van Dijk. See MPEP 2114. The rejections are properly maintained.

Conclusion

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lois Zheng whose telephone number is (571) 272-1248. The examiner can normally be reached on 8:30am - 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Roy King/
Supervisory Patent Examiner, Art
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LLZ
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